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(54) RESIN COMPOSITION FOR COATING

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a resin for coating, and a coating material therefrom curable at low temperatures (room temperature), and having various excellent properties, e.g. high adhesivity and protection to substrates, having scratch- resistance and weather ability.

SOLUTION: This composition contains an acrylic resin having carboxyl and hydroxyl groups, silane compound having glycidyl and hydrolyzable alkoxysilane groups in the molecule, and silane compound having amino or amide group and hydrolyzable alkoxysilane group in the molecule. It is drastically improved in resistance to weather, when the acrylic resin is copolymerized with a polymerizable, ultraviolet-absorptive, unsaturated monomer (R-UVA) and polymerizable, light-stable, unsaturated monomer (R-HALS), to protect the coating film itself and base.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the coating resin composition excellent in the adhesion to a substrate, a sex with a crack-proof, chemical resistance, weatherability, etc., and the paint which will use a coating resin composition usable also as a 1 liquid type, and this constituent if especially required.
[0002]If it furthermore explains in full detail, ABS (acrylonitrile-butadiene-styrene resin), Plastics, such as PC (polycarbonate resin) and PBT (polybutyrene terephthalate resin). It sticks firmly to the metal strengthened with glass fiber or carbon fiber, such as inorganic substances, such as FRP (fiber reinforced plastics), glass, and mortar, iron, and aluminum, and the coating resin composition excellent in the protection nature of a substrate, such as a sex with a crack-proof, is provided.
[0003]
[Description of the Prior Art]Resin, UV, EB hardening resin of the Silang system, etc. are developed as a hard court for the purpose of the sex with a crack-proof of a substrate, and protection.
[0004]the coat obtained from these is hard -- a pencil ******** value (JIS K 5400 8.4.2 (the JIS handbook 29, Japanese Standards Association, 1997) -- 3-6 -- the sex with a crack-proof on **** and spec. is satisfied mostly about H.) However, the marks to which the crack was attached serve as a white slot, are conspicuous and cannot be said to be enough practically still.
[0005]The thing of the Silang system had become an exterior problem that it is easy to cause a crack by temporality, in order that hardening might progress slowly by a condensation reaction. Although this was good for the inorganic system substrate, it had happened plentifully for HAJIKI to be produced, and to be unable to paint well or not to stick to an organic high polymer

system substrate.

[0006]Especially the plastic paint of UV or EB curing system has restriction in the substrate which can be painted on the character of ultraviolet rays in the case of a UV curing paint, a size, shape, etc. from the problem of a device, and the use is limited. It has the greatest fault that coloring is difficult. Degradation of the substrate by which it comes from being unable to say that it is good, and weatherability not being expected under the influence of the sensitizer etc. which remain, either, but the adhesion to a substrate being put to ultraviolet rays etc., and the action to discoloration were also not much insufficient.

[0007]

[Problem(s) to be Solved by the Invention]This invention provides the paint resin which did not choose a substrate but was excellent in coating operability, the adhesion to a substrate, and protection (protection from a sex with a crack-proof, harmful ultraviolet rays, etc.) of a substrate in view of an aforementioned problem.

[0008]If it furthermore says, paint solid content can be made high (that is, the amount of organic solvents discharged in the atmosphere can be lessened), and since the cured film which fully constructed the bridge at low temperature can be obtained, a special coating device etc. are not needed but it excels also from a viewpoint of environmental protection.

[0009]

[Means for Solving the Problem]An acrylic resin (A) in which this invention has a carboxyl group and a hydroxyl group, It is a coating resin composition containing a silane compound (B) which has a glycidyl group and a hydrolytic alkoxysilane group in a monad, and a silane compound (C) which has an amino group or an amide group, and a hydrolytic alkoxysilane group in a monad.

[0010]

[Embodiment of the Invention]The acrylic resin (A) which has a carboxyl group and a hydroxyl group can be manufactured by carrying out copolymerization of a carboxyl group content unsaturated monomer (a-1), a hydroxyl group content unsaturated monomer (a-2), and the other copolymerizable unsaturated monomers (a-3), when manufacturing an acrylic resin.

[0011]As a carboxyl group content unsaturated monomer (a-1), a carboxyl group and the monomer which has an unsaturated double bond can be illustrated in monads, such as acrylic acid, methacrylic acid, maleic acid, and itaconic acid. This monomer may be independent or may be two or more kinds of mixtures. This compound is blended in order to give hardenability, the adhesion to a substrate, and the reducibility (or solubility) to water to a paint.

[0012]As for this compound, it is desirable to carry out copolymerization of the acid value of an acrylic resin (A) preferably, 0.05 to 50 mgKOH, so that it may be set to 1.0 - 35mgKOH. When acid value has the adhesion to a substrate, and the hardenability of a paint in the tendency which gets a little bad in 0 or less than 05 mgKOH and exceeds 50mgKOH, the storage

stability as a 1 liquid type of a paint may get a little bad.

[0013]As a hydroxyl group content unsaturated monomer (a-2), Acrylic acid 2-hydroxyethyl, 2-hydroxypropyl acrylate, Acrylic acid 4-hydroxybutyl, methacrylic acid 2-hydroxyethyl, 2-hydroxypropyl methacrylate, methacrylic acid 4-hydroxybutyl, the monoacrylic ester of cyclohexane dimethanol, the monomethacrylic acid ester of cyclohexane dimethanol, etc. can illustrate in a monad a hydroxyl group and the monomer which has an unsaturated double bond. This monomer may be independent or may be two or more kinds of mixtures. This compound is effectively used, in order to give hardenability and the adhesion to a substrate to a paint.

[0014]As for this compound, it is desirable to carry out copolymerization of the hydroxyl value of an acrylic resin (A) preferably, 0.5 to 120 mgKOH, so that it may be set to 5 - 90mgKOH. When a hydroxyl value is in the tendency for the hardenability of a paint to get worse in less than 0.5 mgKOH and exceeds 120mgKOH, the storage stability of a paint may worsen, and pot life may become short, and coating operability may get worse.

[0015]In this application, other copolymerizable unsaturated monomers (a-3) can be used. As other copolymerizable unsaturated monomers (a-3), Methyl acrylate, ethyl acrylate, acrylic acid propyl, acrylic acid n-butyl, Acrylic acid t-butyl, acrylic acid iso-butyl, acrylic acid cyclohexyl, 2-ethylhexyl acrylate, acrylic acid lauryl, acrylic acid dodecyl, Acrylic acid stearyl, methyl methacrylate, ethyl methacrylate, Methacrylic acid propyl, n-butyl methacrylate, t-butyl methacrylate, Methacrylic acid iso-butyl, cyclohexyl methacrylate, 2-ethylhexyl methacrylate, Radical polymerization nature unsaturated monomers, such as alkyl ester with 1-18 carbon atoms of acrylic acid (meta), such as lauryl methacrylate, methacrylic acid dodecyl, and stearyl methacrylate, styrene, and vinyl acetate, can be illustrated. This monomer may be independent or may be two or more kinds of mixtures. This monomer is effective in order to give performance balance, such as moderate pliability, tough nature, hardness, gloss, and leveling nature, to a paint.

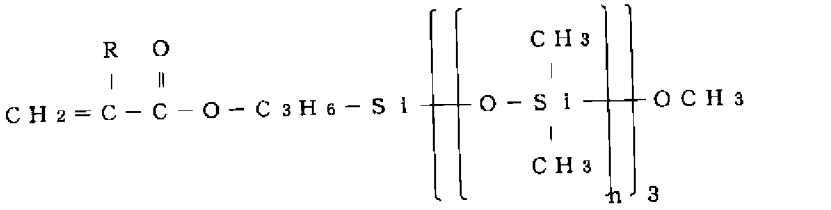
[0016]As a copolymerizable unsaturated monomer (a-3) of others in this application, as unsaturated monomers other than ****, 3-acryloyloxypropyl trimethoxysilane, 3-acryloyloxypropyl triethoxysilane, 3-acryloyloxypropyl triisopropoxy silane, 3-methacryloyl oxypropyl trimethoxysilane, The unsaturated monomer which has a hydrolytic alkoxysilane group and a radical polymerization nature unsaturated double bond in monads, such as 3-methacryloyl oxypropyl triethoxysilane and 3-methacryloyl oxypropyl triisopropoxy silane, The Silang system macro monomer as shown with the following structural formula 1 etc. are copolymerizable. This Silang system unsaturated monomer and a macro monomer may be independent, or may be two or more kinds of mixtures. By carrying out copolymerization of this amount of Silang system unsaturation single, the water repellence of a coat, oil repellency, etc. can be improved and it is in the tendency a result and whose resistance to contamination

improve.

[0017]When copolymerization is preferably carried out 0.5- 10% of the weight 0.02 to 20% of the weight to an acrylic resin (A), an effect is demonstrated most notably and it deals in this Silang system unsaturated monomer and a macro monomer. At less than 0.02 % of the weight, since it becomes the tendency for the storage stability of a paint to get worse when the effect expected is not demonstrated not much notably but exceeds 20 % of the weight, it is not desirable.

[0018]

[Formula 1]



・・・構造式1

ここで、Rは水素原子、またはメチル基
nは1～5000の整数を表す。

As other copolymerizable unsaturated monomers (a-3), by carrying out copolymerization of a polymerization nature ultraviolet absorption nature unsaturated monomer (D) and (R-UVA) further, the weatherability of a coat can be improved and degradation by the ultraviolet rays of a substrate, etc. and tenebrescence can be improved as a larger effect in this application. As R-UVA (D), although the thing of a benzotriazol system is preferred, Especially if it has a radical polymerization nature unsaturated double bond, are not limited, but. For example, 2-(2'-hydroxy-5'-acryloxyethyl phenyl)-2H-benzotriazol, 2-(2'-hydroxy-5'-methacryloxyethyl phenyl)-2H-benzotriazol, etc. can be illustrated. This ultraviolet absorption nature unsaturated monomer may be independent, or may be two or more kinds of mixtures. When these ultraviolet absorption nature unsaturated monomers manufacture an acrylic resin (A), it is preferred to carry out copolymerization simultaneously with other unsaturated monomers. At this time, the good weatherability over a long period of time is secured, and it becomes what maintained balance for many performances in addition to this with the hardenability of the paint, and was excellent.

[0019]As for this ultraviolet absorption nature unsaturated monomer (D), it is desirable to carry out copolymerization 0.5- 30% of the weight to an acrylic resin (A). Effect for weatherproof improvement with the amount of copolymerization sufficient at less than 0.5 % of the weight may not be seen, but when exceeding 30 % of the weight, alkali resistance may get worse a little, and a coat may discolor by contact with alkali.

[0020]As other copolymerizable unsaturated monomers (a-3), by carrying out copolymerization of the polymerization nature light stability unsaturated monomer (R-HALS), the constituent of

this application can improve the weatherability of a coat more, and is still more effective at especially a color coating film. As R-HALS (E), it is 4. -(meta)- The acryloyloxy 1, 2, and 5, 6-tetramethylpiperidine, The 4-(meta) acryloylamino 2, 2, and 6, 6-tetramethylpiperidine, 4-(meth)acryloyloxy 1, 2, 2, and 6, 6-pentamethylpiperidine, The 4-(meta) acryloylamino 1, 2, 2, and 6, 6-pentamethylpiperidine, The 4-cyano 4-(meta) AKURIRORIRU amino- 2, 2, and 6, 6-tetramethylpiperidine, The 1-(meta) acryloylamino 2, 2, and 6, 6-tetramethylpiperidine, The 1-(meta) acryloyl 4-cyano 4-(meta) acryloylamino 2, 2, and 6, 6-tetramethylpiperidine, 4-KUROTO noil oxy-2,2,6,6-tetramethylpiperidine, 4-KUROTO noil amino-2,2,6,6-tetramethylpiperidine, 1-KUROTO noil 4-KUROTO noil oxy-2, 2, and 6, 6-tetramethylpiperidine, etc. can be illustrated. This polymerization nature light stability unsaturated monomer may be independent, or may be two or more kinds of mixtures.